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How vocabulary knowledge of middle-school students from low socioeconomic backgrounds influences comprehension processes and outcomes☆

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ABSTRACT

The influence of poverty on reading achievement begins early in life and accrues over time. Vocabulary knowledge, in particular, is subject to the cumulative disadvantages of poverty and, in turn, has a potent and negative impact on reading comprehension. In the present study, we used path analysis to examine how vocabulary directly and indirectly influenced the reading comprehension of seventh and eighth graders who qualified for free or reduced-price school meals. Findings from a multicomponent model indicated that vocabulary ($\beta = .40$) and inferential comprehension ($\beta = .30$) had the largest direct effects on reading comprehension. Moreover, vocabulary influenced comprehension indirectly through sentence-comprehension efficiency and inferential comprehension. Findings suggest that the impact of poverty permeates reading comprehension through complex and nuanced paths.

1. Introduction

As measured by the most recent National Assessment of Educational Progress (NAEP, 2013), only 20% of eighth-grade students who were eligible for free or reduced-priced school meals read at proficient levels compared to 48% of their peers who were not eligible. While poverty is a potent risk factor for academic difficulty (Neuman & Cunningham, 2009), limited research has examined its influence on the component comprehension skills and processes of secondary readers with low socioeconomic status (SES) (Hart, Soden, Johnson, Schatschneider, & Taylor, 2013. Reading comprehension is a complex process, and many factors have been implicated in attempts to explain variation in student performance (Brasseur-Hock, Hock, Kieffer, Biancarosa, & Deshler, 2011; Cromley & Azevedo, 2007; Reynolds & Turek, 2012). For secondary students, identifying strategic components that explain individual differences is critical for closing academic achievement gaps (Perfetti & Adlof, 2012).

1.1. The influence of poverty on academic performance through differences in language development

The influence of poverty on academic performance begins early in a child's life (Hart & Risley, 1995), accrues over time (Sirin, 2005), and has many causes and correlates (Hart et al., 2013). The reading achievement–poverty link has been attributed to many factors that occur (a) within the home, including limited opportunities for rich and varied language for young children (Hart & Risley, 1995); and (b) within schools that have high concentrations of students from low SES homes (Hart et al., 2013).

While there are many pathways through which socioeconomics influence academic development (Caro, McDonald, & Willms, 2009), a primary path is through the influence of language development, and vocabulary knowledge in particular, on reading achievement (Whitehurst, 1997). Thus, studies have documented that young children who grow up in lower SES households differ from their higher SES peers in both the quality and quantity of language-learning opportunities (Hart & Risley, 1995; Hoff, 2003). The language and vocabulary differences of children from impoverished home environments, in turn, influence reading achievement (Whitehurst & Fischel, 2000) and reading comprehension, in particular (Cain & Oakhill, 2006). Over time, knowledge gaps stemming from lack of

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experience and exposure explain academic discrepancies between students who grow up in poverty and those who do not. Moreover, the cumulative disadvantages explain why it is so difficult for students to catch up in the upper grades (Caro et al., 2009).

The relation of vocabulary and reading comprehension has been largely documented in children in the elementary grades. In this study, we examined the influence of vocabulary on reading comprehension among middle-school students who qualified for free or reduced-price school meals.

1.2. The direct and indirect effects of vocabulary on reading comprehension

Our framework for examining the relation of vocabulary and reading comprehension draws from theories of vocabulary/comprehension and Perfetti's (1999) Reading Systems Framework. The causal mechanisms underlying the vocabulary knowledge-comprehension connection have been explained in multiple theories (see Anderson & Freebody, 1981; Elleman, Lindo, Morphy, & Compton, 2009; Nagy, 2007). Generally, both reading theorists and educators generally agree that reading comprehension is a meaning-construction process in which readers integrate information from the text with their prior knowledge, including their knowledge of word meanings (Kintsch, 1998; van den Broek, 2010).

Vocabulary can have an effect on comprehension in several ways. One prominent theory is that vocabulary knowledge influences reading comprehension directly through knowledge of the words in the text that are essential or instrumental to understanding (Anderson & Freebody, 1981). In support of this theory, studies indicate that comprehension of a passage of text is impaired if as little as 2%–5% of word meanings are unknown (Carver, 1994; Hsueh-Chao & Nation, 2000; Nagy & Scott, 2000). According to this theory, the vocabulary-comprehension path for low-SES middle-school students is due to cumulative differences in vocabulary knowledge acquisition, and one would hypothesize a direct, significant path from vocabulary to comprehension outcomes.

Vocabulary knowledge can also play a role in how efficiently text is processed at the sentence level, which, in turn, affects how fluently and efficiently a passage of text is read. Efficient processing of connected text appears to be more strongly associated with reading comprehension than fluency of reading words in list form (Jenkins, Fuchs, van den Broek, Espin, & Deno, 2003), particularly among adolescent readers (Denton et al., 2011; Eason, Sabatini, Goldberg, Bruce, & Cutting, 2013), which is likely due to the language and semantic skills implicated in reading text efficiently.

Perfetti's Verbal Efficiency Theory (Perfetti, 1985) describes the ways in which efficient word-identification processes help free cognitive demands so that they can be allocated toward comprehension. His Lexical Quality Hypothesis (Perfetti, 2007; Perfetti & Hart, 2002) describes the benefits that deep and comprehensive knowledge of word meanings (in addition to well-specified orthographic and phonological representations) affords in efficiently processing text. Consequently, more knowledge and familiarity with a word allows a reader to more efficiently process text and form connections while reading. For example, Eason et al. (2013) found that vocabulary knowledge contributed to rate in reading connected text (but not rate in reading words in list form) and that text-reading fluency accounted for significant variance in reading comprehension over and above the variance accounted for by rate in reading words in lists. Further, word list reading did not explain significant variance in comprehension skills after text reading rate was accounted for due to the benefits of vocabulary knowledge for both text reading rate and comprehension. Thus, vocabulary plays a major role in how efficiently text is read and ultimately processed for understanding.

Further, vocabulary may not only disrupt comprehension through its impact on sentence-level comprehension and efficiency but also larger units of text because it represents conceptual and topical knowledge that enable readers to fill in gaps and make inferences (Elbro & Buch-Iversen, 2013). Comprehension of larger units of text depends on comprehension at the individual sentence level. Understanding at the sentence level impacts the ability to carry information from sentence to sentence, which further allows the reader to access and integrate the knowledge required to draw inferences (Barnes, Dennis, & Haefele-Kalvaitis, 1996). Van Vreckem, Desoete, and Van Keer (2011) found that with students in grades 1 through 6, understanding at the sentence level was statistically significantly related to inferencing at both the paragraph and whole-passage level. Thus, vocabulary indirectly plays a key role in a chain of influence leading to comprehension given its impact on sentence comprehension, which then influences the ability to form cohesion and make inferences across larger bodies of text.

A complementary explanation is that vocabulary, via indirect effects, impacts comprehension through accrued knowledge that represents not only word knowledge but a broader network of knowledge about the concepts and content related to the word (Anderson & Freebody, 1981). As readers progress through a text about a particular topic, they must retrieve, relate, and update their understanding of the text by making connections or inferences with what they already know. Specifically, Keenan, Hua, Hulslander, Christopher, and Olsen (2014) posited that vocabulary differences contribute to inferential comprehension differences. They discussed that if a word is in a reader's vocabulary, related concepts are activated that promote the connection of ideas in the text. Therefore, students from low-SES households would likely experience inferential comprehension difficulties that are related, in part, to vocabulary differences.

In the Reading Systems Framework, Perfetti and Stafura (2014) articulated the direct and indirect influence of vocabulary on comprehension, noting that the role of vocabulary knowledge has been limited in comprehensive reading comprehension theories. Specifically, they commented that prominent theories of comprehension have focused on the processes readers use to develop a coherent understanding of text and far less to the knowledge sources (e.g., vocabulary knowledge) that influence those processes. In particular, Perfetti and Stafura (2014) identified the central role of word meaning and its relation to text processes as a valuable "pressure point" (p. 26) that may advance our understanding of comprehension differences. In applying their knowledge-process theory, we hypothesized that vocabulary differences of students from low-SES households would affect the comprehension processes that use the knowledge sources (i.e., vocabulary knowledge) to construct meaning, including sentence and inferential comprehension. Because vocabulary directly relates to reading comprehension, and indirectly through higher-order processes (e.g., sentence-comprehension efficiency and inferential comprehension), we included measures of vocabulary and related reading skills and modeled their relations using path analysis.

1.3. Statistical models of reading comprehension

While multiple components (knowledge, processes) have been hypothesized and validated as separate correlates of reading comprehension, research has begun to examine the relative relation of components to comprehension when integrated into statistical models. Models that analyze and integrate multiple components of reading hold great promise for identifying and prioritizing the factors that are most strongly related to reading comprehension.

In one of the few empirical studies that has examined the direct and indirect effect of comprehension components skills of secondary readers, Cromley and Azevedo (2007) measured the relationship of five components (background knowledge, word fluency, vocabulary, strategy use, and inferential comprehension) and reading comprehension in 175 ninth-grade students. In their Direct and Inferential Mediation Model (DIME), a standardized general measure of vocabulary had the strongest total effect of .41 on comprehension, followed by a .34